A New Era at the NIEHS/NTP, with Linda Birnbaum

Ernie Hood

In January 2009 Linda Birnbaum took the reins as the new director of NIEHS and the National Toxicology Program. In this podcast, Birnbaum shares her thoughts on the challenges facing the NIEHS and how she sees the institute meeting those challenges. Prior to her appointment as NIEHS/NTP director, Birnbaum was director of the Experimental Toxicology Division of the National Health and Environmental Effects Research Laboratory, U.S. Environmental Protection Agency.

AHEARN: It's *The Researcher's Perspective*. I'm Ashley Ahearn.

With the inauguration of President Barack Obama in 2009, Dr. Linda Birnbaum became director of the National Institute of Environmental Health Sciences [NIEHS] and National Toxicology Program. In this edition of *The Researcher's Perspective*, science writer Ernie Hood caught up with Dr. Birnbaum on her cell phone at the airport, soon after she took over at the NIEHS, to discuss her goals for the institute and her views on the future of environmental health research.

HOOD: Dr. Birnbaum what do you see as the major challenges facing the institute today in effectively carrying out its mission?[i] Does it all come down to funding, or are the issues deeper than that alone?

BIRNBAUM: Well, I think that the issues we're dealing with today in terms of questions in environmental health are very difficult questions. We're looking at complex diseases that have complex genetics and complex exposures. Just like in the field of genetic diseases, we've really moved beyond the "one gene/one disease" kind of paradigm.[ii] When we're talking about environmental exposures, we're looking at multiple kinds of environmental exposures, not only multiple chemicals, but chemicals plus stress, plus lifestyle factors, plus built environment, plus temperature—many kinds of things that can impact or can play a role in how the environment can affect our health. So, these are much more complex issues than I think we've tried to deal with in the past.

HOOD: Environmental health science has been a rapidly evolving field in recent years.

What is your assessment of the current state of the science? Has the field matured and really started making major contributions to public health, or is that high value in terms of translation still just over the horizon?

BIRNBAUM: I think there's always more we can do, but I think that we've had some major successes. I could think of the example of lead, where the basic research that was done led to an understanding of the fact that there is really no safe level for lead and has led to regulations which have had a major impact in our seeing dramatic drops in the level of blood lead in most of our population.

In addition, there's a lot of stuff that's been done with air pollution, where we now understand that effects are being observed in people at lower amounts, lower levels of air pollution than we ever thought were dangerous before. And we're also getting a better handle on what air pollution might do to people. For many years we focused on the effects on the lung and respiratory disease, but we're beginning to understand that certain kinds of air pollution really target the heart and our vascular system. We're also beginning to understand that exposure to air pollutants to embryos or young children can in fact have long-lasting effects on their health.

So, I think those are just a few— I mean, I could cite many other examples. Asthma is another example where we're getting much better understanding that, for example, there are things that we can do to help reduce the incidence of asthma in people. For example, living in the inner cities, where you have high levels of pollution from dust mites or cockroaches, if we can clean up the homes, we can do a lot better.

HOOD: What do you see as the major unanswered questions in the field today, and how can the NIEHS effectively contribute to finding answers to those questions?

BIRNBAUM: Well, I think the questions are almost unlimited, as are the answers, and I think we have to have a systematic, consistent approach where we try to say what is the real question that we're trying to answer, and not always ask the same questions that we've asked in the past. So we need to think more broadly. The example I said a minute ago about the cardiovascular effects of air pollution—those are things that we never even

thought about until maybe 10 years ago, when in fact we began to see… It was really led by epidemiology studies, studies of human populations, showing that there was increased mortality and hospital visits, for example, at times of serious air pollution, which tended to drop when there wasn't air pollution. And when we began to find out what was really causing these problems, it turned out to be heart disease. So then we went back, and we did animal models so that we could get a better understanding of what caused this.

I think some of the key areas that we're focusing on are the issues at the intersection between the environment and genetics, so that we're beginning to understand that if we do an epidemiology study in a large population, and we can see a risk but it's very limited, if we knew who the real people were at risk, we might find a very high risk in that percentage of the population. And that's because we all have slightly different genes, which can in fact impact how we respond to different kinds of exposures. So that's a very key area.

I think another very key area that we need to be thinking about is the impact of climate change on health. Climate change is going to bring around changes in temperatures, changes in floods and droughts, changes in exposure to chemicals, changes in infectious disease, and we need to be primed to understand what those effects may be so we can begin to develop preventative strategies to avoid health effects.

HOOD: Dr. Birnbaum, as the director of an institute responsible for a $730 million budget and some 1,240 research grants,[iii] do you anticipate the opportunity to encourage more multidisciplinary teamwork in the environmental health sciences research enterprise?

BIRNBAUM: Well, the answer to that last question is: absolutely. I think, again, when we're dealing with complex questions and complex diseases, we need to bring all the best minds we can to bear upon the question. And these kinds of complex problems require a multidisciplinary approach and teams of people getting together.

My approach in science leadership is to empower my staff. I've got a lot of wonderful people who are working, both people working at the bench and people who are working

at the clinic in my intramural program, and I have wonderful guest scientists, program administrators, grants administrators who are working in my extramural program to help stimulate and evaluate the best science that exists throughout our country. And I see my role, in many ways, as helping to provide the strategic leadership, the strategic direction, the strategic thinking which will empower these people to carry out their mission.

HOOD: Dr. Birnbaum, you're off to a great start at NIEHS, and we certainly thank you very much for taking the time to help us get *The Researcher's Perspective* off to a great start, too!

BIRNBAUM: Totally my pleasure!

AHEARN: That was science writer Ernie Hood talking with Dr. Linda Birnbaum, director of the National Institute of Environmental Health Sciences.

And that's *The Researcher's Perspective*. I'm Ashley Ahearn. Thanks for downloading!

Ernie Hood is a science writer, editor, and podcast producer in Hillsborough, North Carolina. He also produces and hosts the weekly science radio show *Radio in Vivo*.

---

[1] The mission of the NIEHS is to reduce the burden of human illness and disability by understanding how the environment influences the development and progression of human disease.

[2] The "one gene/one disease" paradigm assumes that a given disease arises from a single defective gene or molecular pathway. In a more holistic, integrative view of disease etiology, scientists now recognize that many, if not most, diseases result from a complex interplay of multiple genetic and/or environmental factors.

[3] NIEHS. Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S., Named New Director of the National Institute of Environmental Health Sciences [press release]. 3 December 2008. Research Triangle Park, NC:National Institute of Environmental Health Sciences. Available: http://www.niehs.nih.gov/news/releases/2008/birnbaum.cfm [accessed 3 September 2010].